BRANCHING OUT
IPM NEWSLETTER FOR TREES & SHRUBS

New Boxwood Blight

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Boxwoods have suffered from one "blight" or another for as long as they have been grown in North America. The primary microbial culprit has been *Volutella buxi*, a weak opportunist that preys on stressed plants, resulting in leaf browning, cankers and dieback. Boxwoods are also sensitive to abrupt changes in winter temperatures that occasionally plummet from very warm (> 45°F) to very cold (< 20°F) in less than 12 hours, leaving dead leaves and small branches as symptoms. In either of the above cases, affected plants usually recover when the predisposing conditions pass.

A new disease, however, caused by a more aggressive, very recently introduced fungus, *Calonectria pseudonaviculatum* (also known as *Cylindrocladium buxicola* or *C. pseudonaviculatum*) poses a far greater threat to survival of boxwoods everywhere. The fungus was first noted in the UK in 1994 and has since appeared in New Zealand and various European countries. It was first reported in North America in October, 2011 from Connecticut and North Carolina. Two months later, NYS horticultural inspectors found containers of English and Korean boxwood in garden centers in Nassau and Suffolk counties, and a Westchester County detection was made soon after. The boxwoods were destroyed at each of these sites, but because diseased material was presumably shipped into New York during the 2011 growing season, some still asymptomatic but infected plants were no doubt planted into landscapes. Finding those diseased plants and removing them will be important for reducing the spread of this serious disease in NY. Boxwood blight has now been seen in CT, MA, MD, NC, NY, OH, OR, PA, RI and VA, as well as in British Columbia and Ontario, Canada. (And, the list of locations is growing as these words are penned!)

This boxwood disease is not the first case in which a *Cylindrocladium* fungus has affected the aboveground parts of plants in the US: *Cylindrocladium scoparium* causes a classic disease of azaleas with the pathogen first attacking roots and then causing a foliar blight and defoliation. The new boxwood disease is causing symptoms only on foliage and twigs—it has not been reported to cause root rot. The boxwood blight fungus also functions well under cool temperatures and is sensitive to extended periods of high temperature (above 91°F), so it is likely to be a more active problem during spring and fall than during midsummer. *C. pseudonaviculatum* grows over the temperature range of 41 – 86°F, making it very comfortable with weather along both coasts of the US during the growing season. This disease progresses quickly: at the most favorable temperature and moisture levels, the disease cycle (from infection by spores to reproduction of new spores on the same tissue) can be completed in one week.

The boxwood blight fungus also functions well under cool temperatures and is sensitive to extended periods of high temperature.

What to Look For

Dramatic symptoms will have developed by now in any diseased boxwoods that were planted during 2011. The affected boxwoods turn brown and show a great deal of leaf drop—plants may be entirely defoliated or show large sections of bare twigs. Some plants will defoliate starting with the lower branches, and others will first show bare patches at the top. The symptoms can easily be confused with those of our resident Volutella canker, so if you believe you may have a planting with the new disease N Y residents should send a sample to the Plant Disease Diagnostic Laboratory in the Department of Plant Pathology and Plant-Microbe Biology at Cornell (334 Plant Science Building, Ithaca, 14853 for NY residents) for confirmation. Staff at diagnostic labs in other states in the Northeast are also well schooled in ID of the pathogen and can provide a similar service. Because there are so many factors that may lead to bronzing of leaves, including winter burn, it's best to include bare twigs and some fallen leaves in your sample to increase the chance that the pathogen will be detected.

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Boxwood blight symptoms in the landscape

Defoliation is the ultimate effect of Cylindrocladium infection on Buxus species.

Leaf spots on boxwood with boxwood blight

Susceptible Plants

Unfortunately all of the species and cultivars of boxwood that are used in gardens are susceptible to the new boxwood blight. English boxwood is possibly the most susceptible, but American boxwood and Korean boxwood and hybrids also get this disease (see Table 1).

Table 1. Some of the Boxwoods Susceptible to the New Blight

American boxwood	*Buxus sempervirens*
English boxwood	*Buxus sempervirens* 'Suffruticosa'
Little leaf boxwood	*Buxus microphylla*
Japanese boxwood	*Buxus microphylla* var. *japonica*
Korean boxwood	*Buxus sinica* var. *insularis*
Hybrids	*Buxus sinica* var. *insularis X B. sempervirens*

Recently Jim LaMondia at the Connecticut Agricultural Experiment Station found that *Pachysandra terminalis*, Japanese spurge, showed leaf spots and leaf drop when sprayed with *C. pseudonaviculatum* spores. Earlier, tests in the UK showed that *Sarcococca*, another relative of *Buxus*, could be inoculated experimentally. It would thus be a wise practice to keep pachysandra and sarcococca away from boxwoods during nursery production and in retail yards.

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Action If Boxwood Blight is Found

If you find boxwood blight in a landscape planting, once the disease has been properly identified you should remove the shrubs promptly. In a row of boxwoods, remove the obviously diseased plants and ones to either side of them, and consider removing the entire planting. The fallen leaves should be removed as well as the plants, because *C. pseudonaviculatum* produces microsclerotia in the leaves—structures that allow the fungus to survive on site for at least 6 years. Since collecting every last leaf is a more-than-challenging task, it may be best to gather up the surface mulch or soil at the time that the plants are removed. Replacing with new boxwoods is risky, but if your client wants to try, obtain new plants from the most reliable source available, install trickle irrigation (and adjust lawn sprinklers so that they do not impact on the boxwoods' foliage) and provide a layer of fresh mulch around the plants to provide a physical barrier.

Research Needed

Because this is a new disease, no one has all the answers about its biology or its control. Research is needed immediately to provide the green industries with short-term and long-term answers to this new and daunting disease. Which fungicides may be used effectively (in rotations that will slow the rate of resistance development)? Growers in the foliage plant industry quickly saw the development of benzimidazole resistance in *Cylindrocladium scoparium* that was attacking spathiphyllum a few decades ago—thus these fungicides (which contain thiophanate-methyl as their active ingredient) should be used only in rotation with materials with different FRAC codes (FRAC stands for Fungicide Resistance Action committee, which provides a list of fungicides specifying their different modes of action). For now, plant health care professionals in New York will need to choose products that are labeled both for application to boxwood and for use as a spray against *Cylindrocladium*. Laboratory tests in the UK have indicated some benefit from some strobilurin and DMI (demethylation inhibitor) fungicides. Heritage® is one example of the former; Bayleton® and Strike® are examples of the latter. Effectiveness and plant safety for products registered here in New York are not yet documented. Chemical companies may want to establish some 2ee labels to allow use of their fungicides for this important new disease.

Because boxwood blight is now in a new North American environment, its epidemiology needs to be investigated. These studies will explain how the pathogen moves and survives, and the exact conditions it needs for infection, development and spore production on each of its plant hosts. It is only by understanding "how a disease ticks" that we are able to develop strategies to interrupt the pathogen life cycle and curb disease. To ensure the future popularity of boxwoods in gardens it would be ideal to identify the least susceptible cultivars of *Buxus*. Plant breeders at the US National Arboretum are seeking to develop new hybrids or selections of boxwood that will be able to co-exist with the new pathogen while retaining their aesthetic appeal.

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Fortunately, the American Nursery and Landscape Association (ANLA) has already begun to focus on this problem, by establishing a working group and hosting a webinar.

ANLA and IR-4 are facilitating communication among researchers and aiding in the search for research funding. Plant pathologists from a number of university, experiment station, state department of agriculture and USDA labs have joined together to coordinate their research efforts on box blight.

Arborists, nurserymen, and landscape gardeners can help by quickly identifying this disease and destroying infected plants when they are found. Treatments should be used to protect plants in compromised sites, not to treat already-infected plants that cannot be cured. In this first season of knowing that boxwood blight has crept into the US, physically removing as much of it as possible is the appropriate action. Improved strategies for its management will be developed over the next several years. Hopefully this will preserve the health and future of this attractive, deer-resistant ornamental.

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